Sept. 4, 1945. W. F. HUCK 2,383,970

INK DISTRIBUTING MECHANISM

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Fig. 1.

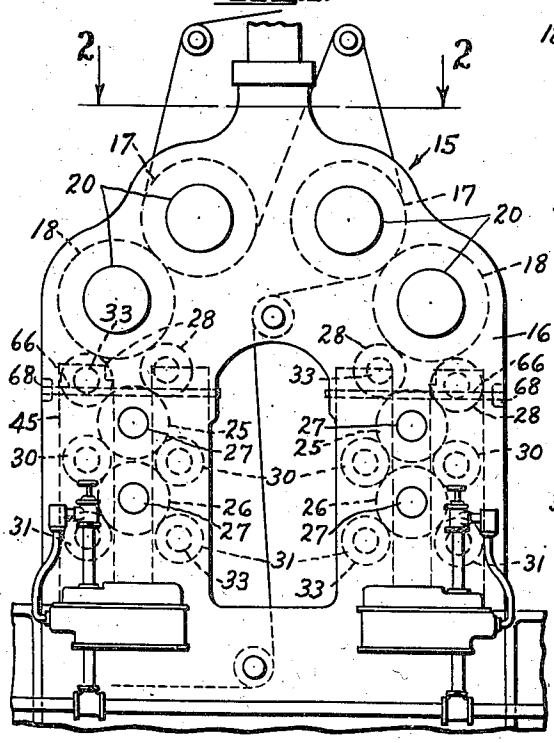


Fig. 2.

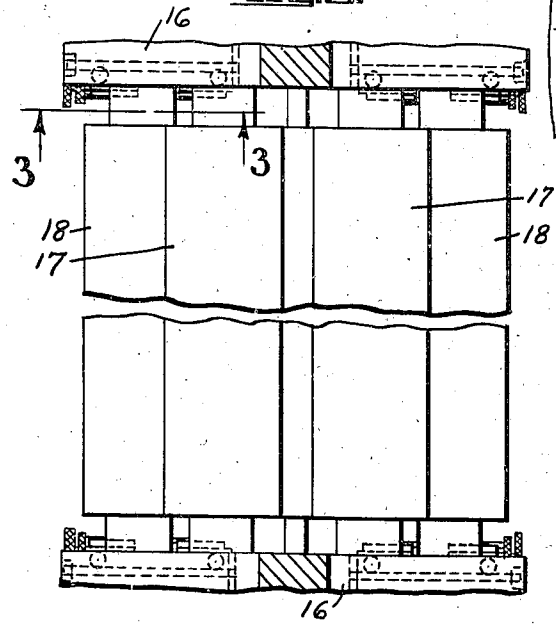
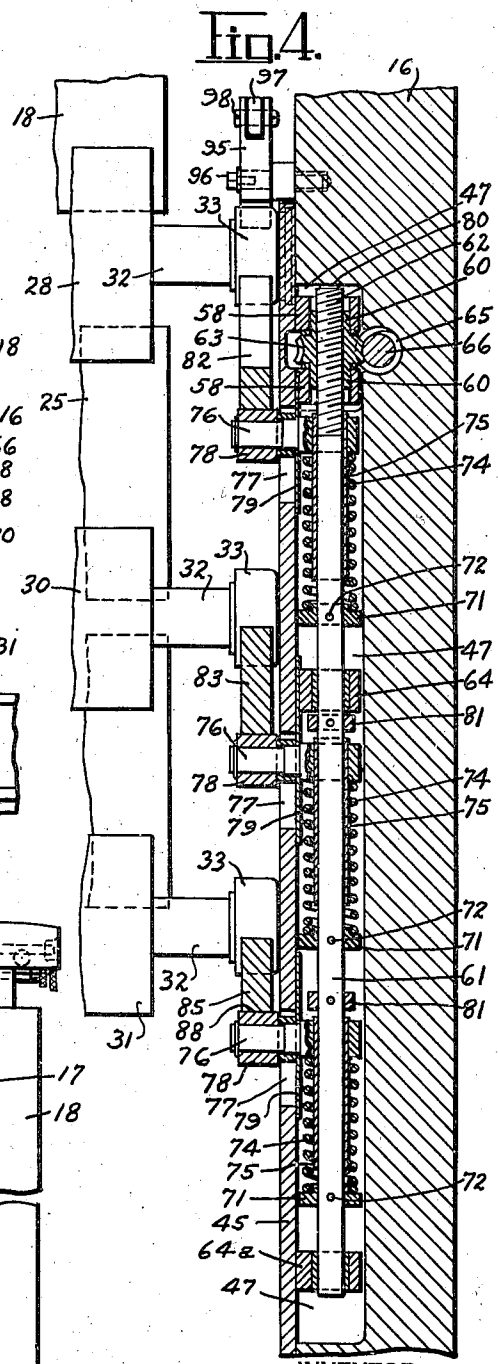


Fig. 4.



INVENTOR

William F. Huck.

BY John R. Dombi

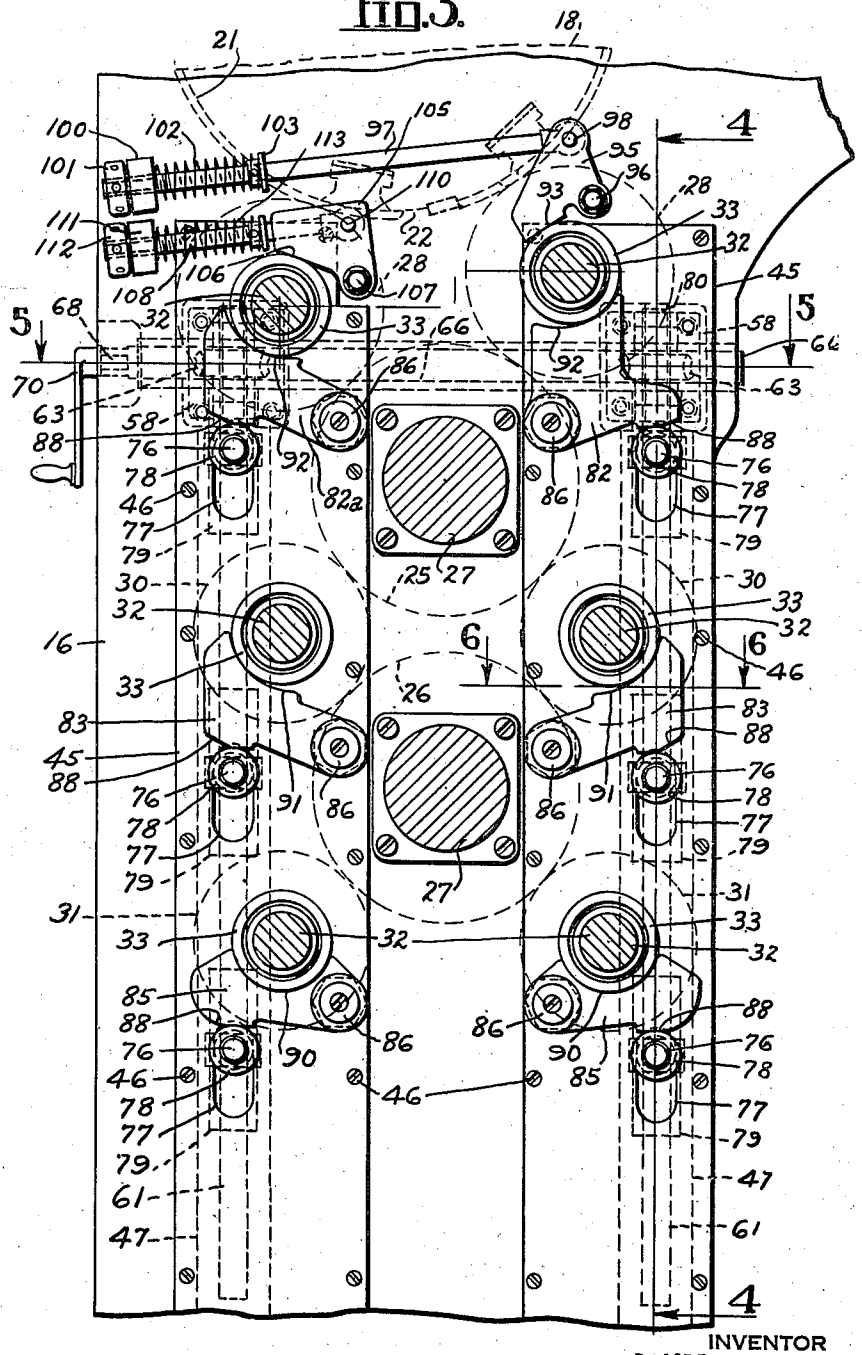
ATTORNEY

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Fig. 3.



INVENTOR
William F. Huck
BY John R. Tomlin
ATTORNEY

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INK DISTRIBUTING MECHANISM

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Fig. 5.

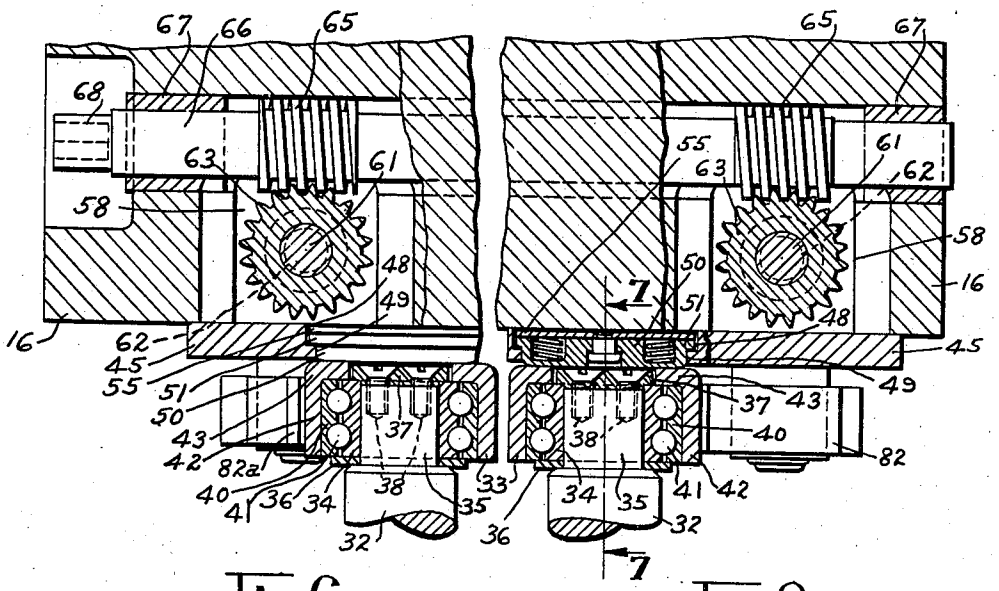


Fig. 6.

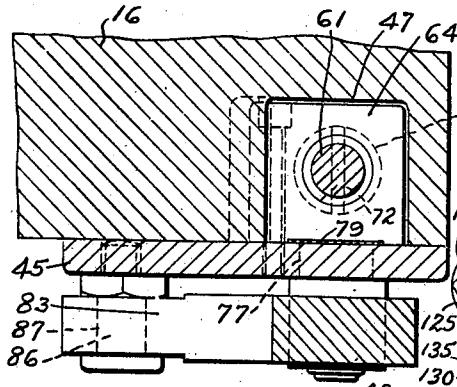


Fig. 7.

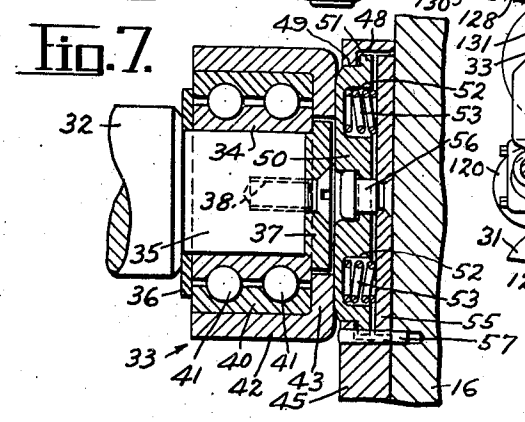
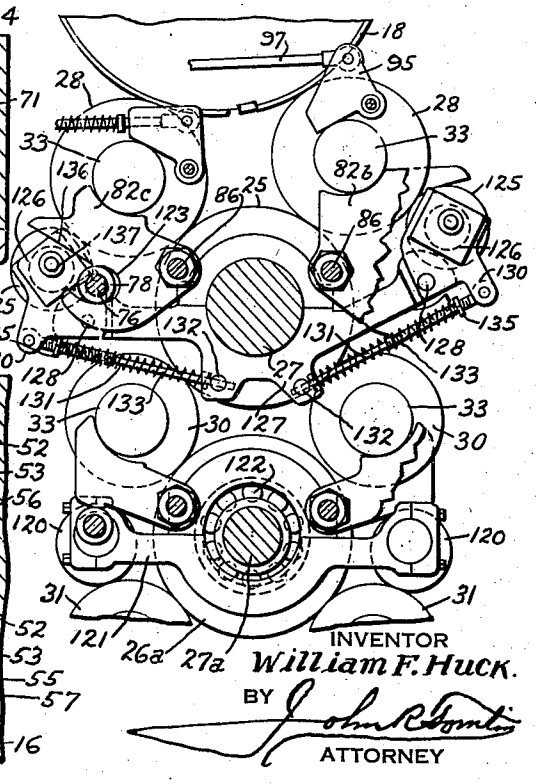


Fig. 8.



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INK DISTRIBUTING MECHANISM

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Fig. 9.

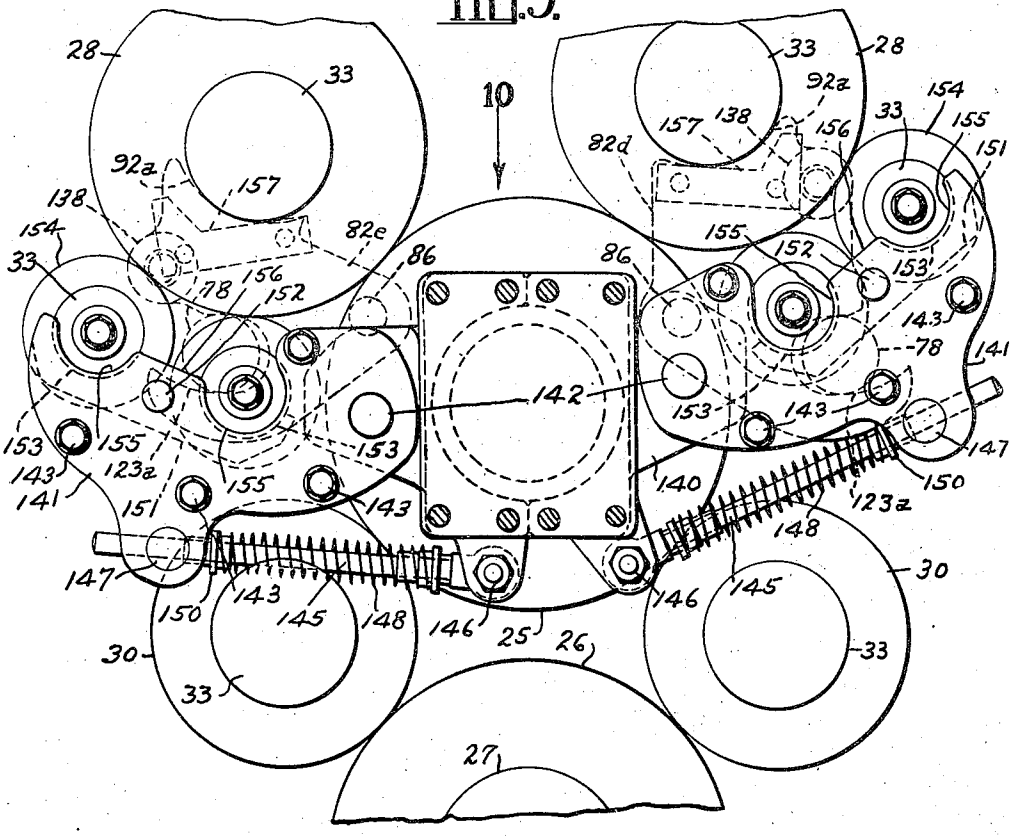


Fig. 10.

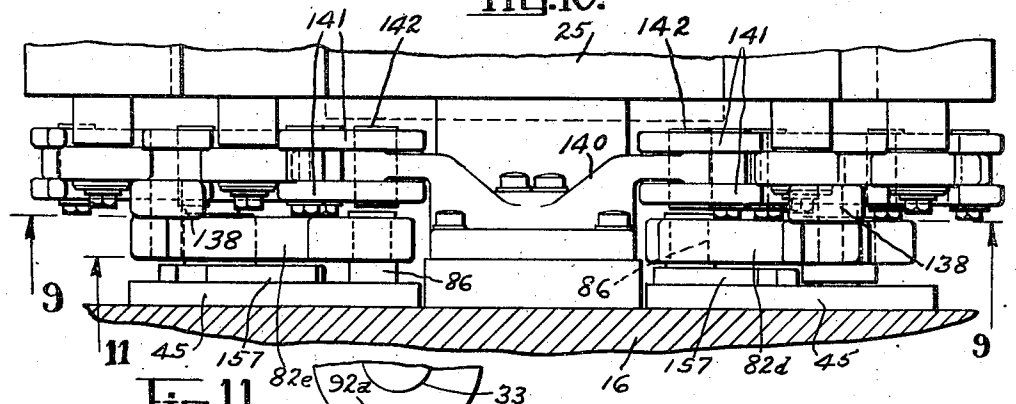
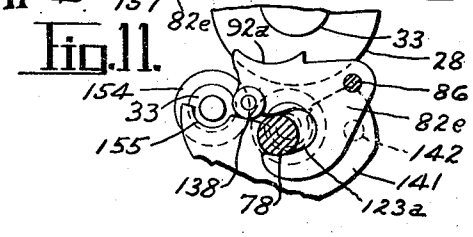


Fig. 11.



INVENTOR
William F. Huck.
BY John R. Bomlin
ATTORNEY

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INK DISTRIBUTING MECHANISM

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Fig. 12.

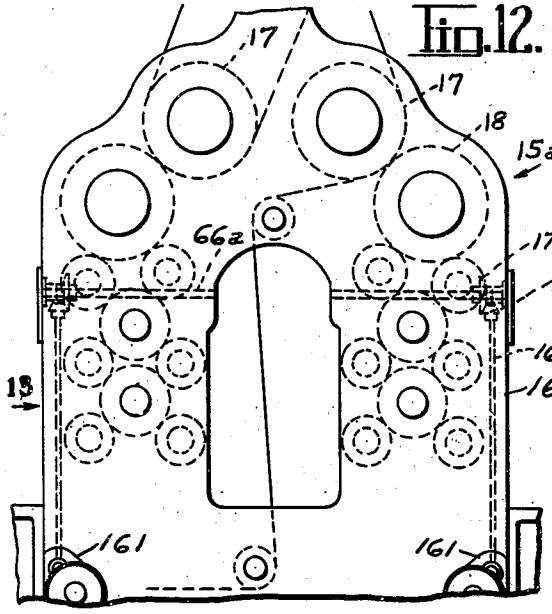


Fig. 14.

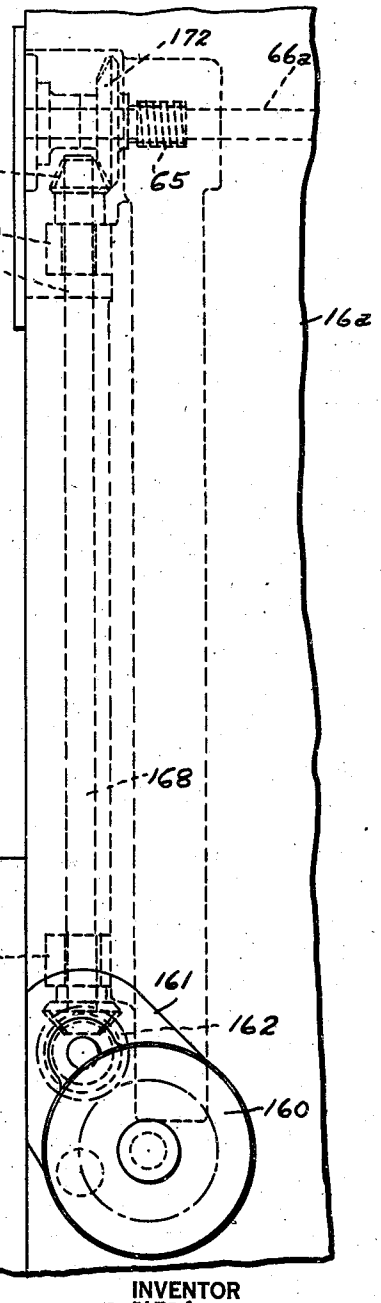
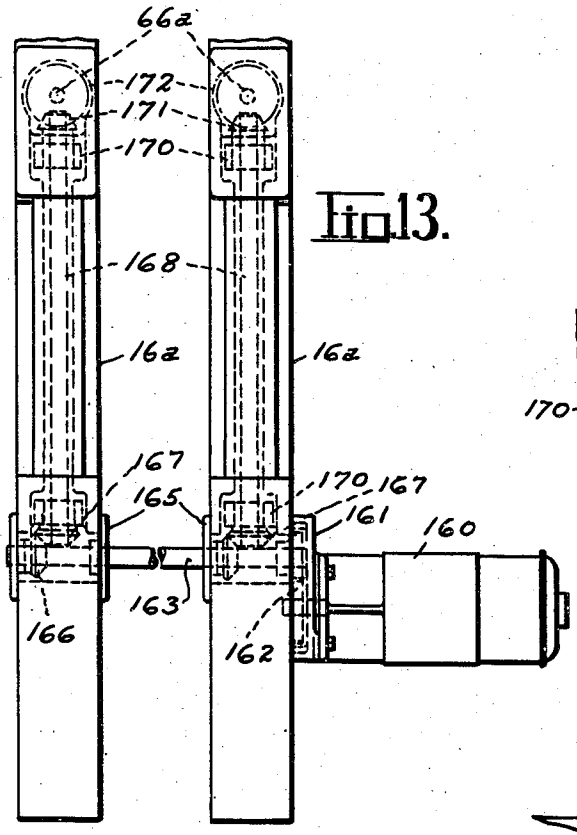


Fig. 13.



INVENTOR
William F. Huck.
BY
ATTORNEY

Patented Sept. 4, 1945

2,383,970

UNITED STATES PATENT OFFICE

2,383,970

INK DISTRIBUTING MECHANISM

William F. Huck, Richmond Hill, N. Y., assignor to R. Hoe & Co., Inc., New York, N. Y., a corporation of New York

Application June 15, 1942, Serial No. 447,091

25 Claims. (Cl. 101—352)

This invention relates to printing machines, and more particularly to improved ink distributing mechanism for rotary printing machines in which cooperating ink distributing cylinders and rollers are constructed and arranged to receive ink from any suitable source of supply and deposit the ink in a uniform film on rotary printing forms.

There are existent certain types of rotary printing machines which employ well known ink distributing mechanism in which inking or form rollers operably engage rotary forms to supply the requisite quantity of ink thereto, and these machines incorporate interrupter mechanism which automatically move the inking rollers from engagement with the form when the printing cylinders have been moved or "tripped" from printing relation.

There are also printing machines in which certain of the ink rollers of an inking mechanism are secured to a movable frame component, and this component may be moved relative to the machine frame to thereby move certain of the rollers from cooperable engagement with other inking components of the inking mechanism. There also exists printing machines having the entire inking mechanism mounted on a portable or movable frame which is so arranged that the entire inking mechanism may be moved from operable engagement with the printing cylinders.

It is an object of this invention to provide an improved inking mechanism for rotary printing machines in which ink distributing rollers may be moved, under control of an operator, to and from cooperable relation with other components of the inking mechanism, or in which form rollers may be moved to and from cooperable relation with the printing form.

Another object of this invention is to provide an improved inking mechanism for a printing machine having rotary ink distributing cylinders and a rotary printing form, the inking mechanism incorporating means for moving ink rollers, under the control of an operator, to and from operable engagement with the ink distributing cylinders and the printing form.

A further object of this invention is to provide an improved inking mechanism for a printing machine having a rotary form or plate cylinder on which arcuate printing forms or plates are secured, and the plates so arranged on the cylinder that the axially-disposed edges of adjacent plates are disposed in spaced relation so that a gap or space exists therebetween, the improved inking mechanism including a form roller operably engaging the printing surfaces of the plates to supply ink thereto, and stop members for engaging the form rollers to hold them against movement towards the form cylinder when the gap between adjacent printing plates is passing the form roller.

Another object of this invention is to provide an improved inking mechanism for a printing machine having rotary ink distributing cylinders and a rotary printing form, the inking mechanism incorporating means for moving ink rollers, under the control of an operator, to and from operable engagement with the ink distributing cylinders and the printing form, and to support ink rollers in either their operative or inoperative positions.

It is also an object of this invention to provide in a printing machine an inking mechanism of generally improved construction and arrangement, whereby the device will be simple, durable, and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in form, proportion and minor details of construction may be made within the scope of the claims without departing from the spirit or sacrificing any advantages of the invention.

For a complete disclosure of the invention, a detailed description thereof will now be given in connection with the accompanying drawings forming a part of the specification, wherein:

Figure 1 is a side elevation of a printing unit which incorporates the improved inking mechanism;

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a fragmental vertical sectional view taken through one side of the printing unit, as indicated by the line 3—3 in Figure 2;

Figure 4 is a fragmental vertical sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a fragmental horizontal sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a fragmental horizontal sectional view taken on the line 6—6 of Figure 3;

Figure 7 is a fragmental vertical sectional view taken on the line 7—7 of Figure 5;

Figure 8 is a fragmental vertical sectional view depicting a modified form of inking mechanism;

Figure 9 is a similar view of another and preferred form of the improved inking mechanism,

the view being taken on the line 9—9 of Figure 10;

Figure 10 is a plan view, parts being shown in section, of the improved mechanism disclosed in Figure 9;

Figure 11 is a fragmental vertical sectional view, taken on the line 11 of Figure 10, depicting a component of the inking mechanism, shown in Figure 9, in a different operative position.

Figure 12 is a side elevation of a printing unit, similar to Figure 1, but which incorporates a slightly modified form of the invention;

Figure 13 is a fragmental end elevation depicting the side members of the modified printing unit, the view being seen in the direction indicated by the arrow 13; in Figure 12; and

Figure 14 is an enlarged fragmental side view of the modified printing unit.

Referring to the drawings, in which similar reference characters designate corresponding parts, there is depicted a modern high speed rotary printing unit 15, which is best seen in Figure 1. The unit depicted is of the newspaper type, although it is to be understood, of course, that this improved ink distributing mechanism is applicable to other types of rotary printing machines. The unit 15 includes a frame having side members 16 which rotatably support two printing couples, each couple including an impression cylinder 17 and a plate or form cylinder 18, which are rotatably mounted in suitable bearings 20 carried by the side member 16 of the machine frame. Each plate or form cylinder 18 supports "curved" printing plates or forms 21 (Figure 3), which are arranged on the form cylinder in conformity with the usual practice, so that adjacent axially-disposed edges of the plates are located in spaced relation to leave a space or gap 22 therebetween, the plates being secured to the cylinder by the usual plate clamps, in conformity with the usual practice well understood by those skilled in the art.

The printing faces of the plates on each plate cylinder 18 have ink supplied thereto through an improved ink distributing mechanism, which includes an upper ink distributing cylinder 25 and a lower ink distributing cylinder 26, each ink distributing cylinder having a shaft 27 which is supported for rotary and reciprocatory movements in bearings supported by the side member 16 of the machine frame, in conformity with the usual practice. Inasmuch as the mechanism for rotating the ink distributing cylinders and the mechanism for reciprocating these cylinders are well understood by those skilled in the art, such mechanism has not been depicted in this application.

Form rollers 28 operably engage each upper ink distributing cylinder 25 and the forms or plates 21 on each plate cylinder 18. Transfer rollers 30 operably engage the upper and lower ink distributing cylinders 25 and 26 at each side thereof. Ink distributing rollers 31 operably engage each lower ink distributing cylinder 26, and these form rollers and ink distributing rollers are held against axial or longitudinal movement but are movable transversely towards and away from the form cylinder and ink distributing cylinders by a mechanism which will be hereinafter disclosed. Each roller 28, 30 and 31 is provided with a shaft 32, and each shaft 32 has an antifriction bearing unit 33 suitably secured to each terminal thereof, as best seen in Figures 3, 4, 5 and 7. Each bearing unit 33 includes an inner bearing ring 34, which is secured on a reduced portion 35 of each shaft 32 between a collar 36, which surrounds the reduced portions 35 of the shaft, and a disc or head 37, which is secured to the outer terminal of the shaft 32 by countersunk screws 38, as best seen in Figures 5 and 7. An outer bearing ring 40 surrounds the inner bearing ring 34 in concentric spaced relation, and each bearing ring has the usual circular raceways for the operable reception of conventional anti-friction balls 41. The outer bearing ring 40 is snugly received within a cylindrical shell or housing 42, having a radially-disposed terminal flange 43, which forms the outer terminal of the bearing unit and which is arranged for engagement with instrumentalities to be hereinafter disclosed to thereby limit the axial movement of the ink distributing roller.

The inner face of each frame side member 16 is provided with spaced vertically-disposed face plates 45, which are secured to the inner face of the side member 16 by screws 46 (Figure 3), or other suitable securing devices. Each face plate 45 provides a closure for an elongated vertically-disposed recess 47, formed in each side member 16 of the machine frame, and each recess 47 receives components of the improved inking mechanism to be hereinafter disclosed.

Each face plate 45 is provided with cylindrical recesses 48 (Figures 5 and 7) which extend into the plate from its inner face, and these recesses 48 are preferably located in substantially axial alignment with the rollers 28, 30 and 31 when these rollers are in their operative position, which position is depicted in Figure 3. Each recess 48 is reduced in diameter at the outer face of the face plate 45 to provide an annular retaining flange 49 for cooperation with instrumentalities to be hereinafter disclosed.

An abutment device is received within each recess 48, and each abutment device includes an abutment disc or member 50, having a flange 51 formed on the peripheral portion thereof, which is received for sliding axial movement within the recess 48, and the abutment member 50 normally projects beyond the outer face of the face plate 45 and engages the terminal flange 43 of the bearing unit shell 42. Each abutment member 50 is provided with axially-disposed recesses 52 for the reception of helical extension springs 53, and one terminal of each spring 53 engages the bottom of the recess 52. Its opposite terminal engages a disc or plate 55 which is received within the recess 48 and normally abuts the inner face of the side member 16, so that the normal tendency of the extension spring 53 to expand axially causes the springs to react against the plate or disc 55 and force the abutment member 50 against the terminal flange 43 of a bearing unit shell 42, to thereby hold the ink distributing or form roller against excessive axial movement, but permits sufficient axial movement thereof to perform a cushioning or shock-absorbing function. The abutment member 50 and disc 55 are secured in assembled relation by a rivet 56, which is rigidly secured to the disc 55, but permits limited axial movement of the abutment member 50. The abutment member 50 and disc 55 are held against rotation by a pin or key 57.

Each face plate 45 has spaced bearing blocks 58 (Figures 3, 4 and 5) secured to the upper terminal thereof, and these bearing blocks extend into a recess 47 and are provided with aligned bearings for the reception of hubs 60, which are formed on a worm wheel 63 having internal screw threads which engage threads 62 on the upper

portion of a vertically-slidable shaft 61 which is held against rotation. Each worm wheel 63 is held against axial movement by thrust rings or washers interposed between it and the bearing block 58, and the worm wheel 63 is operably engaged by a worm 65 carried on a horizontally-disposed shaft 66 rotatably mounted in bearings 67 supported by the side member 16 of the machine frame. One terminal of each shaft 66 is provided with a wrench engaging surface 68 for the reception of a crank wrench 70, shown in Figure 3. By this arrangement, rotation of the crank 70 rotates the shaft 66 and its worms 65, and the intermeshing teeth of each worm 65 and worm wheel 63 rotates the worm wheel 63, thereby elevating or lowering the shaft 61 in the worm wheel 63 and in its intermediate slide bearing 64 and lower slide bearing 64*a* carried by the face plate 45, and best seen in Figures 4 and 6.

Each vertically-disposed shaft 61 has a plurality of rectangular collars 71 (Figure 4) each secured thereto by a pin 72. One side of each collar 71 engages the plate 45, and the shaft 61 is thus prevented from turning, although permitted to move vertically. A helical extension spring 74 abuts against each collar 71 and surrounds a sleeve or tube 75 slidably mounted on the shaft 61, and each sleeve is rigidly secured to a stud 76 which extends through a vertically-disposed slot 77 formed in the face plate 45 and rotatably supports a roller 78 at its outer terminal. Each stud 76 has a slide plate or closure 79 secured thereto and which slidably engages the inner face of the face plate to provide a closure for each slot 77. By this arrangement, the vertical recess 47 is completely closed to protect the components therein against extraneous matter and to also house lubricant if desired.

The upward movement of each vertically-slidable shaft 61 is limited by a stop surface 80, formed at its upper terminal, engaging the upper terminal of the recess 47, (Figure 4), and upward sliding movement of the sleeves 75 along the shaft 61, in response to the tension of the springs 74, is limited by stop collars 81, which are pinned or otherwise secured to the shaft 61.

Each face plate 45 has an upper cam 82 or 82*a*, (Figure 3) an intermediate cam 83, and a lower cam 85 each mounted for pivotal movement about a fulcrum stud 86, which is suitably secured to the face plate, and each fulcrum stud 86 is received within a cylindrical aperture 87 formed in each cam, as best seen in Figure 6. Each cam is provided with a roller-engaging surface 88 (Figure 3), which is engaged by a roller 78 to move each cam about its fulcrum or pivot stud 86. Each lower cam 85 is provided with an arcuate cam or supporting surface 90 which is adapted to engage the peripheral portion of a bearing unit 33 to support a lower ink distributing roller 31 in operable or inoperable positions. Each intermediate cam 83 is provided with an arcuate cam or supporting surface 91 adapted to engage the peripheral surface of the bearing unit 33 of a transfer roller 30 to support the roller in operable or inoperable positions. The upper cams 82 and 82*a* are provided with arcuate cam or supporting surfaces 92 adapted to engage the peripheral portions of the bearing units of the form rollers to thereby support the rollers in operable or inoperable positions. It will be seen that the rollers 28 and 30 are held in the position shown in Figure 3, by the combined action of two forces—the force applied to the bearing units 33 by the cam faces 92 and 91 respectively, and also the force of gravity. As shown in the drawings, the cam faces 91 are so shaped that the resultant of the two forces is exerted in a horizontal plane and presses the rollers 30 with substantially equal force against the cylinders 25 and 26, and the cam faces 92 are so shaped that the rollers 28 are also pressed with substantially equal force against the cylinder 25 and the plates 21. Obviously, by changing the pressure angle of the cam faces or the strength of the springs 74, the distribution of pressure may be predetermined to be either equal, or unequal to any desired extent.

The peripheral portion of the bearing unit 33 of one form roller 28 is engaged by a stop surface 93 formed on a stop member 95, which is fulcrumed or pivoted to the side member 16 of the machine frame on a fulcrum stud 96, as best seen in Figures 3 and 4. The stop member 95 is pivotally secured to a link or rod 97, as indicated at 98, and the outer terminal of the link or rod 97 extends through an aperture formed in a lug 100 carried by the side member 16 of the machine frame. This rod has an adjusting nut 101 threaded thereon, and the peripheral portion of the nut is provided with apertures for the reception of a pin wrench, not shown. By rotating the nut 101 with a pin wrench, the stop surface 93 is moved to engagement with the bearing unit 33 of a form roller 28 to hold the form roller against movement towards the axis of the form cylinder when the gap 22 between adjacent printing plates 21 carried by the form cylinder is passing the engaged portion of the form roller. An extension spring 102 is mounted on the link 97, and one terminal of this spring engages a collar 103 secured to the link, and the opposed terminal engages the lug 100 to thereby constantly force the nut 101 into engagement with the stud to prevent any backlash in the threaded engagement between the link 97 and nut 101 and to also secure the nut against unintentional rotation. A stop member 105, which is similar in function to the stop member 95, has a stop surface 106 which engages the bearing unit 33 of the second form roller, and this stop member is pivotally secured to the side member 16 of the machine frame on a fulcrum stud 107. A link or rod 108 is pivotally secured to the stop member, as indicated at 110, and the outer terminal of this link passes through an aperture formed in a lug 111, and this outer terminal is provided with threads to receive an adjusting nut 112, similar to the nut 101. This link is also provided with an extension spring 113 which is similar in construction and operation to the spring 102.

In the operation of the improved ink distributing mechanism, the ink distributing cylinders and rollers cooperate to work the supplied ink into a uniform film which is deposited on the form carried by the form cylinder, and the ink is preferably supplied to the lower ink distributing cylinder by any suitable supply means, which means has not been depicted because it does not form a part of this invention. When it is desired to move the ink distributing rollers and form rollers transversely into operable engagement with the ink distributing cylinders and form cylinders, the crank 70 is placed on each shaft 66, and the shafts 66 are rotated until the stop surface 80 at the upper terminal of each vertical shaft 61 engages the upper terminal of the recess 47, as shown in Figure 4. When each shaft 61 has reached the limit of its upward movement, then the upper cams 82 and 82*a*, the intermediate cams 83 and

the lower cams 85 will have moved about their fulcrum studs 86 to their uppermost position, as shown in Figure 3, in which position the arcuate cam surfaces 92 of the upper cams 82 and 82a engage the peripheral surfaces of the bearing units 33 of the form rollers 28, so that these form rollers are forced into correct operable engagement with the upper ink distributing cylinder 25 and the printing surfaces of the plates or forms 21 carried by the form cylinders 18. The form rollers 28 are secured in their operable position against movement away from the upper ink distributing cylinder 25 and the form cylinder 18 by the upper cams 82 and 82a, but as the gap 22 between adjacent printing plates 21 passes the bite between each form roller 28 and the form cylinder 18, each form roller tends to jump toward the axis of the form cylinder 18. This action, however, is prevented by the stop members 95 and 105, because the stop surfaces 93 and 106 of these stop members so engage the peripheral surfaces of the bearing units 33 of the form rollers 28 as to prevent them moving radially towards the axis of the form cylinder. During the normal operation of the ink distributing mechanism, the ink distributing rollers and form rollers are rotated, and the ink distributing cylinders are both rotating and reciprocating. The "drag" of the reciprocating ink distributing cylinders 25 and 26 on the engaged ink distributing rollers and form rollers tend to axially move these rollers, but these rollers, as hereinbefore stated, are held against excessive axial movement by the spring-pressed abutments 50. These abutments, however, yield sufficiently to produce a cushioning or shock-absorbing action.

The collars 71 are preferably so positioned with relation to their supporting shafts 61, that when each shaft 61 is in its uppermost position, as determined by the engagement of its stop surface 80 with the upper terminal of the recess 47, the springs 74 impart sufficient stress to the cams 82, 82a, 83 and 85, through the interposed studs 76 and roller 78, to cause these cams to hold the ink distributing rollers and form rollers under correct operable tension against the ink distributing cylinders 25, 26 and the plates 21 on the form cylinder 18.

When it is desired to move the form rollers 28 and ink distributing rollers 30 and 31 from engagement with the forms and the ink distributing cylinders, the crank 70 is applied to each shaft 66 to rotate the shaft in a direction which is opposed to its previous operation, thus causing the worm wheels or nuts 63 to rotate and lower the shaft, thereby lowering the studs 76 and rollers 78. As the rollers 78 descend, the cams 82, 82a, 83 and 85 move downwardly about their fulcrums, thus permitting the form rollers 28 and ink distributing rollers 30 and 31 to move from operable engagement with the ink distributing cylinders and the forms on the form cylinder 18. These cams also support the form rollers and ink distributing rollers in their inoperative position.

It will be observed that the supporting surface 90 of each lower cam 85 is shaped to support an ink distributing roller 31 in inoperative position and to also force the ink distributing roller against the ink distributing cylinder 26 for correct operable engagement. The supporting surface 91 of each intermediate cam 83 is shaped to support a transfer or ink distributing roller 30 in its inoperative position and to also force the ink distributing roller against both the upper ink distributing cylinder 25 and lower ink distributing cylinder 26 in correct operable relation. This is also true of the upper cams 82 and 82a, because their arcuate supporting surfaces 92 are shaped to support the form rollers 28 in their inoperative position and to also force these rollers against the printing faces of the plates 21 on the form cylinder 18 and against the peripheral surface of the upper ink distributing cylinder 25 when in operative position. The cams 82 and 82a are similar in construction and operation, except the cam 82 has some dimensions increased to accommodate the elevated position of the right hand form roller 28 relative to the left hand form roller 28, as viewed in Figure 3.

In Figure 8 a modified form of the invention is depicted, in which the ink distributing rollers and cylinders hereinbefore disclosed are employed. The lower ink distributing rollers 31 are engaged by rider rollers 120 which are rotatably supported by yokes 121 which are carried by the lower ink distributing cylinder 26a, the yoke being operably secured to the cylinder shaft 27a through interposed anti-friction bearings 122 which are constructed and arranged to permit limited vertical movement of the yoke 121 relative to the ink distributing cylinder shaft 27a, thereby permitting the rider rollers 120 to rest on the lower ink distributing rollers 31. Inasmuch as the yokes 121 are carried by the reciprocating ink distributing cylinder 26a, these yokes impart reciprocatory movement to the rider rollers 120, so that they reciprocate relative to the axially-stationary ink distributing rollers 31, to thus aid in better distributing the supplied ink. The intermediate ink distributing or transfer rollers 30 are supported in a manner hereinbefore disclosed except that the right hand roller is supported in spaced relation relative to the lower ink distributing cylinder 26a. It has been found in practice that, under certain operating conditions, the supplied ink is better distributed by operating this transfer roller out of engagement with the lower ink distributing cylinder. Form rollers 28 are supported in a manner hereinbefore disclosed, except the cams or levers 82b and 82c are provided with slots 123, shown at the left of Figure 8, to operably receive therein the upper rollers 78 which are raised and lowered by the vertical shaft 61, for a purpose to be hereinafter explained. Rider rollers 125 are located to operably engage the form rollers 28, and these rider rollers are rotatably carried by supporting arms 126 which are pivotally secured to a bracket 127, as indicated at 128. Fingers or projections 130 extend outwardly from the supporting arms 126, and these fingers are pivotally secured to rods 131. Each rod 131 has one terminal slidably mounted in a lug or poppet 132 which is swiveled to the bracket 127, and a helical extension spring 133 surrounds each rod 131 and has one terminal abutting a poppet 132 and its opposed terminal abutting an adjusting collar or nut 135 which is threadedly secured to the rod. The springs press outwardly on the collars 135 and force the supporting arms 126 to move about their pivots 128 to thus bias the arms 126 for movement in a direction towards the form rollers, so that the rider rollers 125 are pressed into operable engagement with the form rollers 28. The degree of tension or bias exerted by the springs 133 may be adjusted by manipulating the adjusting collar 135. A surface 136 of each cam or lever 82b and 82c, seen at the left of Figure 8, overhangs a roller 137 carried by each supporting arm 126. Inasmuch as the rider rollers 125 are bias towards engagement with the form rollers 28, it is

necessary to force these rollers from engagement with the form rollers when it is desired to separate these rollers. As the upper rollers 78 move downwardly with the vertically-movable shafts 61, these rollers engage the lower part or wall of the slots 123, thereby moving the levers or cams 82b and 82c downwardly above their pivots or fulcrums 86 until the surfaces 126 engage the rollers 137, and then further downward movement of the cams 82b and 82c swing the supporting arms 126 outwardly about their pivots 128, thus moving the rider rollers 125 from engagement with the form rollers 28. As the rods 61 are moved downwardly, the lower ink distributing rollers 31 move from engagement with the lower ink distributing cylinder 26a and also from engagement with the rider rollers 120.

In the mechanism hereinbefore disclosed in Figure 8, one rider roller has been provided for operable engagement with a form roller, but it has been found that although the provision of one rider roller for each cooperating roller effects a marked improvement in uniform ink distribution, that two rollers still further improves the uniformity in the distribution.

An arrangement in which two rider rollers are provided for each form roller is disclosed in Figures 9, 10 and 11 of this application. In this arrangement, the form rollers 28 are supported in operable engagement with the form cylinder, not shown, by cams or levers 82d and 82e, which are pivoted on studs 86 supported by the side member of the machine frame, and these cams or levers are swung about their pivots 86 by the upper rollers 78, which engage the slots 123a, similar to those disclosed in Figure 8. As the upper rollers 78 move upwardly by the upward movement of their shafts 61, the cam surfaces 92a of these cams or levers engage the peripheral portions of the form roller bearing units 33, to thus force the form rollers 28 into operable engagement with the plates or forms on the form cylinder, in the manner hereinbefore disclosed. The cams or levers 82d and 82e, each support a roller 138, which perform functions to be hereinafter explained.

A bracket 140 is secured to each side member 16 of the machine frame, and spaced lever plates 141 are pivotally secured to each side of the bracket 140 by pivot pins 142. The complementary plates 141 are held in pairs in spaced relations by spacing studs or bolts 143. Rods 145 are pivotally secured to each bracket 140, as indicated at 146, and the opposed terminal of each rod is slidably received in an aperture formed in a rock shaft 147 pivotally secured to the lower terminals of the lever plates 141. Each rod 145 is surrounded by an extension spring 148, which presses outwardly on a slidable sleeve 150 that engages the rock shaft 147, thereby biasing the united lever plates 141 upwardly about their pivots or fulcrum pin 142, for a purpose to be hereinafter disclosed.

A rock plate or support member 151 is mounted for rocking movement between each pair of spaced lever plates 141 on a swivel pin 152, which is located midway between the terminals of the rock plates. Each rock plate 151 is provided with two arcuate recesses 153, one recess being located at each side of the swivel pin and preferably equidistant therefrom, for the reception of bearing units 33 which rotatably support the rider rollers 154, so that two rider rollers are provided for each form roller. Each roller 154 is supported by the bearing units 33 in the same manner that the ink distributing rollers hereinbefore disclosed are supported. In order to permit limited rocking movement of the bearing units 33 of the rider rollers 154 relative to the spaced lever plates 141, these lever plates are provided with axially aligned recesses 155, which are located in approximate alignment with the axes of the rider rollers 154 when such rollers are in their normal operative position, as disclosed in Figure 9. Inasmuch as the bearing units 33 which support the rider rollers 154 are mounted in recesses 153 formed in the rock plates 151, each rock plate will rock about its swivel pin 152 as the rider rollers 154 are forced into engagement with the form rollers 28 by the upward movement of the lever plates 141 about their pivot pins 142 responsive to the tension exerted by the springs 148, and thereby equalize the pressure of the rider rollers 154 against the form roller 28.

When it is desired to move the rider rollers 154 from engagement with the form rollers 28, and the form rollers from engagement with the form cylinder, the vertically movable shafts 61, hereinbefore disclosed, are moved downwardly by manipulating the crank 70, and the downward movement of these shafts causes their upper rollers 78 to engage the lower surfaces of the slots 123a formed in the cams 82d and 82e, thereby causing these cams to swing downwardly about their pivots 86. As each cam moves downwardly, it releases a form roller 28, and its roller 138 engages a flat surface 156 formed on a lever plate 141, thereby forcing the pair of plates to move downwardly about their pivot pin 142, thus moving their rider rollers 154 from engagement with the form rollers 28. During the initial downward movement of the cams 82d and 82e about their pivots 86, the bearing unit 33 of each form roller 28 engages a trough-shaped stop plate 157 carried by the side member 16 of the machine frame, and the stop plates 157 support the form roller 28 in this position, thereby preventing further movement of the form roller away from the form cylinder, and continued downward movement of the cams 82d and 82e separate the rider rollers 154 from the supported form rollers 28, as best seen in Figure 11.

In Figures 12, 13 and 14, there is disclosed an improved power-driven mechanism for moving the ink distributing rollers and form rollers to and from operable engagement with the ink distributing cylinders and form cylinder of each printing couple in the printing unit. This mechanism includes reversible electric motors 160 which are secured to suitable gear housings 161, which housings are, in turn, secured to one side member 16a of the machine frame. Each motor 160 drives spur gears 162 which are operably supported in the gear housing 161, and these gears drive a horizontal shaft 163, which is rotatably mounted in suitable bearings 165 carried by the side members 16a of the machine frame. A horizontal shaft 163 is provided for each inking mechanism, and each shaft carries bevel gears 166 adjacent its terminals, which gears mesh with similar gears 167 carried at the lower terminals of vertical shafts 168, rotatably mounted in suitable bearings 170 in the side member 16a of the machine frame. A bevel pinion 171 is secured to the upper terminal of each shaft 168, and each pinion 171 meshes with a bevel gear 172 carried by a horizontal shaft 66a. Each shaft 66a is provided with worms 65 to mesh with worm wheels 63, to operate in the manner hereinbefore disclosed, in order to raise and lower the vertically-movable shafts 61, to thereby move the form rollers and ink dis-

tributing rollers into operable engagement with the ink distributing cylinders and form cylinders, or to move the said rollers from engagement therewith.

By this arrangement motor-control switches, not shown, may be located at selected stations for convenient manipulation by the machine operators, and the form rollers and ink distributing rollers may be moved into operable engagement with the form cylinders and ink distributing cylinders simply by establishing an electric current to each motor to operate it in one direction, or the rollers may be moved to inoperative positions by causing the motors to rotate in the opposite direction.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive.

Having thus described my invention, what I claim as new and useful is:

1. In an inking mechanism for a printing machine having a cylinder, a roller adapted for cooperable engagement with the cylinder, a bearing at each end of the roller and each bearing having a component whereby the roller is rotatably supported, means for engaging the said component of each bearing to hold the roller against axial movement but permitting floating transverse movement of the roller, movably-supported members each having an open arcuate supporting surface shaped to engage the said component of each bearing and move the roller transversely into operable engagement with the cylinder and to support the roller in operable engagement with the cylinder and also support the roller in a position away from engagement with the cylinder, and means for moving the said movably-supported members to move the roller into operable engagement with the cylinder or to permit movement of the roller away from engagement with the cylinder.

2. In an inking mechanism for a printing machine having a plurality of cylinders, a roller adapted for cooperable engagement with two of the cylinders, a bearing at each end of the roller and each bearing having a component whereby the roller is rotatably supported, means for engaging the said component of each bearing to hold the roller against axial movement but permitting floating transverse movement of the roller, movably-supported members each having an open arcuate supporting surface shaped to engage the said component of each bearing and move the roller transversely into operable engagement with the cylinders and to support the roller in operable engagement with the cylinders and also support the roller in a position away from engagement with the cylinders, and means for moving the said movably-supported members to move the roller into operable engagement with the cylinders or to permit movement of the roller away from engagement with the cylinders.

3. In an inking mechanism for a printing machine having a form cylinder and an ink distributing cylinder, form rollers in running engagement with forms on the form cylinder and with the ink distributing cylinder, ink rollers in running engagement with the ink distributing cylinder, a bearing at each end of each roller and each bearing having a component whereby the roller is rotatably supported, means for engaging the said component of each bearing to hold each roller against axial movement but permitting floating transverse movement of the roller, movable roller supports which engage the said components of the bearings for the form rollers and the ink rollers, and means for simultaneously moving the roller supports to bodily move the form rollers and the ink rollers into and out of engagement with the forms and ink distributing cylinder.

4. In an inking mechanism for a printing machine having a form cylinder and an ink distributing cylinder, a form roller in running engagement with forms on the form cylinder and with the ink distributing cylinder, ink rollers in running engagement with the ink distributing cylinder, a rider roller in running engagement with the form roller, a bearing at each end of each roller and each bearing having a component whereby the roller is rotatably supported, means for engaging the said component of each bearing to hold each roller against axial movement but permitting floating transverse movement of the roller, movable roller-supports which engage the said components of the bearings for the form roller, the rider roller and the ink rollers, and means for simultaneously moving the roller-supports to bodily move the said rollers into and out of contact with the members with which they have running engagement.

5. In an inking mechanism for a rotary printing machine having two ink cylinders to which ink is supplied, an ink roller in running engagement with both cylinders, a bearing at each end of each roller and each bearing having a component whereby the roller is rotatably supported, means for engaging the said component of each bearing to hold each roller against axial movement but permitting floating transverse movement of the roller, movable roller supports having open curved surfaces which engage the rotatable components of the bearings for supporting the ink roller, and mechanism for engaging the supports to move the ink roller toward and away from the cylinders, the said mechanism being arranged to exert a force on the supports in such direction as to compensate for the force of gravity on the roller to thereby press the ink roller against each cylinder with substantially the same pressure.

6. In an inking mechanism for a printing machine having two rotary ink distributing cylinders, an ink roller adapted for simultaneous cooperable engagement with both ink distributing cylinders, bearings for the ink roller, means for holding the ink roller against axial movement but permitting floating transverse movement thereof towards and away from the ink distributing cylinders, movably-supported members, a segmental arcuate supporting surface formed on each movably-supported member and shaped to engage an ink roller bearing to move the ink roller transversely into operable engagement with both ink distributing cylinders and to support the ink roller in operable engagement with both ink distributing cylinders and also support the ink roller in a position in which it is moved from engagement with the ink distributing cylinders, and means for moving the movably-supported member to move the ink roller into operable engagement with the ink distributing cylinders and to permit movement of the ink roller away from operable engagement with the ink distributing cylinders.

7. In an inking mechanism for a printing machine having a rotary ink distributing cylinder, an ink roller adapter for cooperable en-

gagement with the ink distributing cylinder, bearings for the ink roller, means for holding the ink roller against axial movement but permitting free transverse movement thereof away from the ink distributing cylinder, a movably-supported member adapted to engage an ink roller bearing to move the ink roller transversely into operable engagement with the ink distributing cylinder and to support the ink roller in operable engagement with the ink distributing cylinder and also support the ink roller in a position in which it is moved from engagement with the ink distributing cylinder, and power-driven means operable under control of an operator for engaging and moving the said member to move the ink roller into operable engagement with the ink distributing cylinder and to permit movement of the ink roller away from operable engagement with the ink distributing cylinder.

8. In an inking mechanism for a printing machine having a form cylinder, a form roller adapted for cooperable engagement with the form cylinder, means for holding the form roller against axial movement but permitting floating transverse movement thereof towards and away from the form cylinder, a bearing carried by the form roller at each end thereof and each bearing having a component whereby the form roller is rotatably supported, movably-supported members, a segmental arcuate surface formed on each movably-supported member and shaped to engage the said component of each bearing to move the form roller transversely into operable engagement with the form cylinder and to support the form roller in a position in which it is moved from engagement with the form cylinder, and means for moving the said movably-supported members to thereby move the form roller into operable engagement with the form cylinder and to permit movement of the form roller from operable engagement with the form cylinder.

9. In an inking mechanism for a printing machine having a rotary form cylinder, a form roller adapted for cooperable engagement with the form cylinder, bearings for the form roller, means for holding the form roller against axial movement but permitting free transverse movement thereof towards and away from the form cylinder, movably-supported members having open curved surfaces adapted to engage the form roller bearings to move the form roller transversely into operable engagement with the form cylinder and to support the form roller in operable engagement with the form cylinder and also support the form roller in a position in which it is moved from engagement with the form cylinder, and power-driven means under control of an operator for engaging and moving the said member to move the form roller into operable engagement with the form cylinder or to permit movement of the form roller away from operable engagement with the form cylinder.

10. In an inking mechanism for a printing machine having a rotary form cylinder and arcuate forms supported by the peripheral portion of the form cylinder in spaced relation to provide an axially disposed gap therebetween, a rotary form roller operably engaging the form on the form cylinder and biased for movement towards the form cylinder, a bearing carried by the roller at each end thereof and each bearing having a component whereby the roller is rotatably supported, non-yieldable stop members each adapted to engage the said component of each bearing of the form roller and to hold the roller against movement towards the form cylinder thereby preventing movement of the form roller towards the form cylinder when the said gap operably passes the form roller.

11. In an inking mechanism for a printing machine having a rotary form cylinder and arcuate forms supported by the peripheral portion of the form cylinder in spaced relation to provide an axially-disposed gap therebetween, a rotary form roller operably engaging the forms on the form cylinder and biased for movement towards the form cylinder, bearings for the form roller, a pivotally supported stop member positioned to engage a form roller bearing, a threaded link pivotally secured to the stop member, a fixed lug, a nut engaging the threads of the link and abutting the lug to adjustably move the stop member into engagement with a roller bearing to hold the roller against movement towards the form cylinder thereby preventing movement of the form roller towards the form cylinder when the said gap is operably passing the form roller, and means to take up the backlash between the threads of the nut and the link.

12. In an inking mechanism for a printing machine having a rotary form cylinder and arcuate forms supported by the peripheral portion of the form cylinder in spaced relation to define an axially-disposed gap therebetween, a rotary form roller operably engaging the forms on the form cylinder and biased for movement towards the form cylinder, a bearing unit operably secured to each terminal of the form roller to support the form roller for rotative movement, each bearing unit having a component whereby the roller is rotatably supported, means for engaging the said components of the bearing units to prevent substantial axial movement of the form roller, and pivotally supported stop members each adjustably positioned to engage the said component of each bearing unit to hold the form roller against movement towards the form cylinder when the said gap is operably passing the form roller.

13. In an inking mechanism for a printing machine having a rotary form cylinder and arcuate forms supported by the peripheral portion of the form cylinder in spaced relation to define an axially-disposed gap therebetween, a rotary form roller operably engaging the forms on the form cylinder and biased for movement towards the form cylinder, a bearing unit operably secured to each terminal of the form roller, each bearing unit having a component whereby the form roller is rotatably supported, plates for engaging the said components of the bearing units to prevent substantial axial movement of the form roller, a pivotally supported stop member, a link pivotally secured to the stop member, a lug slidably receiving the link, and an adjusting nut threadedly secured to the link and engaging the lug to adjustably position the stop member in engagement with a bearing unit component to prevent movement of the form roller towards the form cylinder when the said gap is operably passing the form roller.

14. In an inking mechanism for a printing machine having a rotary cylinder, an ink roller adapted for cooperable engagement with the cylinder, bearings for the ink roller, a pivotally supported cam engaging an ink roller bearing and movable about its pivot to move the ink roller transversely into cooperable engagement with the cylinder and movable about its pivot to permit

movement of the ink roller away from operable engagement with the cylinder, an axially-slidable shaft, a collar secured to the shaft, a stud slidable relative to the shaft, a roller rotatably supported by the stud, an extension spring surrounding the shaft and interposed between the collar and stud, and means for axially moving the shaft to thereby compress the spring between the collar and stud to force the roller on the stud into engagement with the cam thereby moving the cam about its pivot to force the ink roller into operable engagement with the cylinder.

15. In an inking mechanism for a printing machine having a rotary cylinder, an ink roller adapted for cooperable engagement with the cylinder, bearings for the ink roller, a pivotally supported cam engaging an ink roller bearing and movable about its pivot to move the ink roller transversely into operable engagement with the cylinder and movable about its pivot to permit movement of the ink roller away from operable engagement with the cylinder, an axially-slidable shaft, a collar secured to the shaft, a stud slidable relative to the shaft, a roller rotatably supported by the stud, an extension spring surrounding the shaft and interposed between the collar and stud, means for axially moving the shaft to thereby compress the spring between the collar and stud to force the roller on the stud into engagement with the cam thereby moving the cam about its pivot to force the ink roller into operable engagement with the cylinder, and means for limiting the axial movement of the shaft in the direction in which the movement compresses the spring so that the spring exerts a predetermined bias on the engaged stud.

16. In an inking mechanism for a printing machine having a rotary form cylinder and a rotary ink distributing cylinder, a form roller adapted for cooperable engagement with the form cylinder and ink distributing cylinder, bearings for the form roller, a rider roller adapted for cooperable engagement with the form roller, a movably-supported cam having a segmental arcuate surface adapted to engage a form roller bearing to move the form roller transversely into operable engagement with the said cylinders and to support the form roller in operable engagement with the said cylinders, a movably-supported lever for supporting the rider roller for transverse movement towards and away from the form roller, means for constantly biasing the lever for movement in a direction to move the rider roller into engagement with the form roller, and means under control of an operator for moving the cam to move the form roller into operable engagement with the said cylinders or to permit movement of the form roller away from engagement with the said cylinders, movement of the cam in one direction causing the cam to engage the lever to forcibly move the lever to move the rider roller from engagement with the form roller.

17. In an inking mechanism for a printing machine having a rotary form cylinder and a rotary ink distributing cylinder, a form roller adapted for cooperable engagement with the form cylinder and ink distributing cylinder, bearings for the form roller, a plurality of rider rollers adapted for cooperable engagement with the form roller, a movably-supported cam having a segmental arcuate surface adapted to engage a form roller bearing to move the form roller transversely into operable engagement with the said cylinders and to support the form roller in operable engagement with the said cylinders, a movably-supported lever, a rockable member supporting the rider rollers for rocking movement relative to the lever, the lever and rockable member supporting the rider rollers for transverse movement towards and away from the form roller, means for constantly biasing the lever for movement in a direction to move the rider rollers into engagement with the form roller, and means under control of an operator for moving the cam to move the form roller into operable engagement with the said cylinders or to permit movement of the form roller away from engagement with the said cylinders, movement of the cam in one direction causing the came to engage the lever to forcibly move the lever to move the rider rollers from engagement with the form roller.

18. In an inking mechanism for a printing machine having a rotary form cylinder and a rotary ink distributing cylinder, a form roller adapted for cooperable engagement with the form cylinder and ink distributing cylinder, bearings for the form roller, a rider roller adapted for cooperable engagement with the form cylinder, a movably-supported cam having a segmental arcuate surface adapted to engage a form roller bearing to move the form roller transversely into operable engagement with the said cylinders and to support the form roller in operable engagement with the said cylinders, a movably-supported lever for supporting the rider roller for transverse movement towards and away from the form roller, means for constantly biasing the lever for movement in a direction to move the rider roller into engagement with the form roller, means independent of the cam for supporting the form roller in a position in which it disengages the said cylinders, and means under control of an operator for moving the cam to move the form roller into operable engagement with the said cylinders or to permit movement of the form roller away from engagement with the said cylinders and into engagement with the said supporting means, movement of the cam in one direction causing the cam to engage the lever to move the lever and move the rider rollers from engagement with the supported form roller.

19. In a printing machine, an inking mechanism including an ink cylinder, a plurality of rollers arranged to move independently to and from operable engagement with the cylinder, bearings for the rollers, independent movable members having cam surfaces for engaging the said roller bearings, and means under control of an operator for simultaneously engaging the movable members to force their cam surfaces into engagement with the roller bearings for moving the rollers in unison into and out of engagement with the cylinder and to hold the roller surfaces into engagement with the cylinder surface to exert predetermined surface pressure.

20. In a printing machine, an inking mechanism including an ink cylinder, a roller arranged to move to and from operable engagement with the cylinder, bearings for the roller, movable members each having an open cam surface of predetermined configuration and adapted to engage a roller bearing, and means for moving the movable members to thereby move the roller into and out of operable engagement with the cylinder, the configuration of the cam surfaces of the movable members being arranged to so engage the roller support as to compensate for the gravity pull on the roller so that the roller

is held with its surface in contact with the cylinder surface under predetermined surface pressure.

21. In a printing machine having a form cylinder, an inking mechanism including an ink cylinder, form rollers adapted to operably engage the form cylinder and ink cylinder, means for simultaneously moving the rollers from engagement with the cylinders, spring biased rider rollers operably engaging the form rollers, and means for moving the rider rollers from engagement with the said rollers.

22. In a printing machine, an inking mechanism including two spaced ink cylinders, a roller arranged to move to and from operable engagement with both cylinders, bearings for the roller, movable members each having an open cam surface of predetermined configuration and adapted to engage a roller bearing, and means for moving the movable members to thereby move the roller into and out of operable engagement with the cylinders; the cam surfaces of the movable members being arranged to so engage the roller bearings as to compensate for the gravity pull on the roller so that the roller is forced into engagement with both cylinders with its surface in contact with the cylinders under predetermined surface pressure.

23. In a printing machine having a form cylinder, an inking mechanism including an ink cylinder, form rollers adapted to operably engage the form cylinder and ink cylinder, spring biased rider rollers operably engaging the form rollers, means for moving the form rollers from contact with the cylinders, and means coupled to the form roller moving means for moving the rider rollers from engagement with the form rollers.

24. In a printing machine, an inking mechanism including two spaced ink cylinders, a roller, a bearing for the roller, and resilient means for moving the roller into and out of operable engagement with the cylinders, the said means including a cam surface that in cooperation with the pull of gravity acts upon the said roller bearing to force the roller into engagement with both of the cylinders with equal pressure.

25. In a printing machine, an inking mechanism including two spaced ink cylinders, an ink roller arranged to move to and from engagement with both cylinders, bearing units rotatably supporting the roller, a cam member having an open cam surface to engage and support each bearing unit so as to press the roller against both cylinders, and resilient means for moving the cam members to thereby move the roller into and out of operable engagement with the cylinders; the open cam surface of each cam member being formed to press against a bearing unit at such an angle that the force of gravity acting on the roller and the pressure of the cam members on the bearing units acting together will press the roller with substantially equal force against both cylinders.

WILLIAM F. HUCK.